PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

	Date of mailing *(day/month/year)*
Applicant's or agent's file reference **NEC04P194**	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/JP2004/015155	**14.10.2004**	**26.12.2003**

International Patent Classification (IPC) or both national classification and IPC

Applicant
NEC CORPORATION

1. This opinion contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☒	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☒	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/JP Facsimile No.	Authorized officer Telephone No.

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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material

      ☐ in written format

      ☐ in computer readable form

   c. time of filing/furnishing

      ☐ contained in the international application as filed.

      ☐ filed together with the international application in computer readable form.

      ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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Box No. III **Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☒ claims Nos. 14-26

because:

☐ the said international application, or the said claims Nos. _____
relate to the following subject matter which does not require an international preliminary examination (*specify*):

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. _____
are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. _____ are so inadequately supported
by the description that no meaningful opinion could be formed.

☒ no international search report has been established for said claims Nos. 14-26

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form
- ☐ has not been furnished
- ☐ does not comply with the standard

the computer readable form
- ☐ has not been furnished
- ☐ does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.

☐ See Supplemental Box for further details.

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Box No. IV **Lack of unity of invention**

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has:

   ☒ paid partial additional fees

   ☐ paid additional fees under protest

   ☐ not paid additional fees

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

   ☐ complied with

   ☒ not complied with for the following reasons:

(1) The inventions of claims 1-16 are inventions in which the height of at least two optical elements is regulated, whereas the inventions of claims 17-26 relate to a method for forming a necessary optical element from an optical element array. Therefore, the two groups cannot be said to have a special technical feature.

(2) Regarding claims 1-16, JP 5-67769 A (document 1), for example, represents prior art. This document discloses a three-dimensional photoelectronic integrated circuit device in which a light emitting element Em and a light receiving element Pd are arranged in region 1, a drive circuit and other components are disposed in region 2 of each substrate Sn, and each light emitting element Em and light receiving element Pd has a fixed height (in particular, see Par. Nos. 0017-0025, Figs. 2 to 4).

Therefore, the inventions of claims 1-2, 5-7 clearly do not possess novelty over document 1.

(3) Because the inventions of claims 1-2, 5-7 do not possess novelty, the inventions of claims 3-4, 8-16 dependent thereon are further examined. Among them, the inventions of claims 3-4, 9 relate to solders, the inventions of claims 10-13 relate to specific optical elements, and the inventions of claims 14-16 relate to electrode patterns. Therefore, those groups of inventions have different technical features.

(4) Therefore the present application includes inventions having at least five different special technical features: (i) claims 1-2, 5-8, (ii) claims 3-4, 9, (iii) claims 10-13, (iv) claims 14-16, and (v) claims 17-26.

(5) The additional fee was provided only for two inventions.

4. Consequently, this opinion has been established in respect of the following parts of the international application:

   ☐ all parts

   ☒ the parts relating to claims Nos. 1-13

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	3-4, 8-13	YES
	Claims	1-2,5-7	NO
Inventive step (IS)	Claims		YES
	Claims	1-13	NO
Industrial applicability (IA)	Claims	1-13	YES
	Claims		NO

2. Citations and explanations:

Document 1: JP 5-67769 A
Document 2: JP 4-61175 A
Document 3: JP 6-275870 A

(1) Document 1 describes a three-dimensional photoelectronic integrated circuit device in which a plurality of light emitting elements (surface light emitting lasers) and a plurality of light receiving elements (MSM-type photodetectors) are disposed on each substrate Sn (see Par. No. 0017-0025, Fig. 2 to Fig. 4). Here, it is obvious that the surface light emitting lasers or MSM-type photodetectors have respectively identical element structures and surface light emitting lasers and MSM-type photodetectors have different element structures.

Therefore, "the height of the element" in document 1 is found to be the same for the surface light emitting lasers or MSM-type photodetectors and is different for the surface light emitting lasers and MSM-type photodetectors.

Furthermore, in the present application "the heights of the light emitting surface or light receiving surface" are not clearly defined (see Box VIII of the present written opinion). However, whatever is the definition, in document 1, the surface light emitting lasers or MSM-type photodetectors have respectively identical element structures. Therefore, the height of the light emitting surfaces of the surface light emitting lasers or the height of the light receiving surfaces of the MSM-type photodetectors are respectively identical.

Therefore, the inventions of claims 1-2, 5-7 do not appear to possess novelty over document 1, and the invention of claim 8 does not appear to involve an inventive step based on document 1.

(2) Document 1 describes a semiconductor integrated circuit device of a type in which optical elements are formed by direct film deposition or diffusion on a substrate. However, this method of forming optical elements on a substrate is not limiting, and assembling the components by soldering or the like is a well-known technique (for example, see document 2).

In particular, document 2 describes that solder bumps with different melting points are used, the connection operation with a solder having a high melting point is initially conducted, and then connection with a solder having a low melting point is conducted (page 3, lower left column).

Therefore, the inventions of claims 3-4, 9 do not appear to involve and inventive step based on documents 1-2.

(3) Using a light collecting member such as a microlens in a semiconductor integrated circuit device comprising integrated optical elements is also apparently a well-known technique (for example, see document 3 (Fig. 24 and the like)).

Therefore, the inventions of claims 10-13 do not appear to involve an inventive step based on documents 1-3.

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Box No. VIII **Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

In the present application "the height of the light emitting surface or light receiving surface" of an optical element are not clearly defined. (Apparently it can mean the height from a light emitting surface or a light receiving surface formed inside a semiconductor element to the substrate, but neither the specification nor drawings of the present application supports such an assumption).